A.I.A. File No. 35-P-1

ARCHITECTS' REFERENCE BULLETIN—1934 SERIES

BUILDING MARKETS CORPORATION 40 EAST 49th STREET, NEW YORK CITY

SAFEGUARDING SCREEN INSTALLATIONS

Modern Construction Details and Specifications For Window Screens, Screen Doors, Porch Screens

WITH the recent advent of INCONEL *"AGELESS"* Screen Cloth the importance of good window and door screen design is greatly accentuated. Inconel screen cloth as herein described is made of a material which is so highly resistant to corrosion or depreciation of any kind that its useful life is at least equal to that of the frames in which it is installed. Consequently the better the screen installation, the longer will be the life of all screens during which time no maintenance or replacement costs will be involved. The purpose of this bulletin is to bring to the architect ready reference data on modern window and door screen design; authoritative simplified specifications and suggestions as to the solution of any type of screening problem considering both efficiency and ultimate economy. This information has been obtained from reliable sources and specification data taken primarily from the recommendations of the New York Building Congress as presented in detail beginning on page 6. Before approaching the subject of correct design and specifications for window and door screens, it seems advisable to present brief definite information as to INCONEL *"AGELESS"* Screen Cloth and the reasons why its use becomes a primary factor in safeguarding all types of screen installations.

INCONEL—THE AGELESS WHITE METAL

AFTER years of experience in producing nickel alloys to meet various requirements of fabrication, use, and exposure, The International Nickel Company has now developed for the manufacturer of screen cloth a new metal alloy—*INCONEL.* Its use in the form of screen cloth was announced to architects for the first time in May, 1933, through Architects' Reference Bulletin Number A-4. Since that time a number of interesting installations have added further proof of the manufacturer's claims as to the unusual practicability of INCONEL for screen cloth purposes under any type of exposure.

For over five years the Engineering Department of The International Nickel Company has been carrying on tests with this particular alloy. Gradually, it has been brought to a state of practical perfection from the point of view of performance under adverse conditions and practicability of use for various processes. The metal is found to be almost entirely proof against staining and corrosion. Its color is nearly the same as Monel Metal, a silvery white metal. When drawn into wire it possesses tensile strength of over 120,000 pounds—far in excess of requirements for screen cloth.

EASY SOLUTION TO ALL SCREEN CLOTH PROBLEMS

REGARDLESS of the care which might be exercised by architects and screen manufacturers in the correct detailing and installation of screening projects, there have been certain problems to which no type of metal or finish offered a full solution until the introduction of INCONEL *"AGELESS"* Screen Cloth. These have included more or less rapid deterioration of the metal fabric, particularly in areas adversely affected by salt water conditions and chemicals found in areas in and adjacent to large industrial centers. In addition

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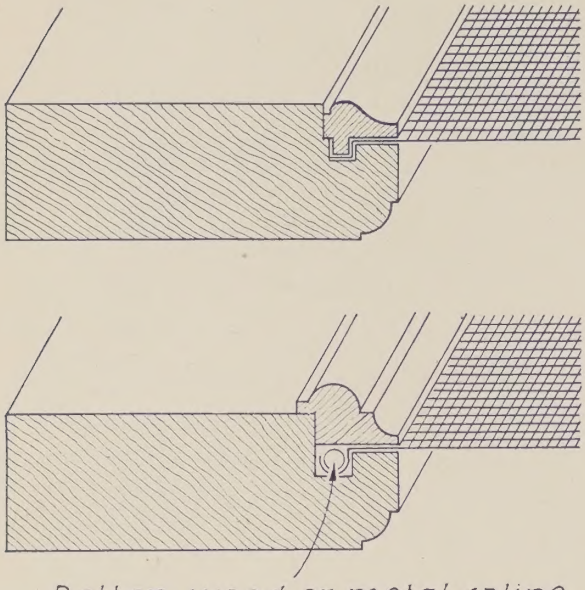


Rattan, wood or metal spline

On this and following pages are shown typical details for correct construction of wood and metal screen frames.

to such deterioration, calling for expensive replacement, corrosion of such metals has in thousands of instances been responsible for the staining of painted frames, adjoining woodwork and masonry exteriors of all types. To the cost of re-screening, there has been added the expensive cost of repainting and refinishing around and particularly below exterior openings of buildings of all types. To these problems a definite answer is provided by the use of Inconel Screen Cloth because careful observation has shown that this material will hold its color, dirt and soot deposits being easily removed by washing. It apparently offers practically complete resistance against corrosion and holds its strength continuously thereby being highly resistant to breakage or bulging, either in the cloth areas or at points of attachment to frames.

The ingredients of this chrome-nickel alloy are so balanced that no damaging metal salts accumulate on Inconel Screen Cloth through exposure to the elements or their chemical contents. Consequently, there can be no staining to adjacent woodwork or masonry except occasionally a slight dustlike film which is easily washed off with a wet cloth and does not impregnate. This fact in itself justifies the use of INCONEL *"AGELESS"* Screen Cloth, particularly for better installations. Due to the great tensile strength of Inconel a wire slightly smaller than customary can be used providing a higher degree of visibility which is an added feature.

Arrangements have been made for the fabrication of Inconel Screen Cloth which is made available through dealers and distributors in every part of the country. The enclosed post card will bring a sample of the actual material and information as to exactly where it may be obtained. It is available in standard sizes and while higher in cost per square foot than any material now on the market, it is the cheapest ultimate material for use in better projects because it approaches lifetime service in eliminating maintenance and replacement costs. Prices will be given on application and any screen manufacturer or the larger woodworking plants will quote on screening projects to include the use of this product.

FIELD AND LABORATORY TESTS

THE Engineering Department of The International Nickel Company started the first testing of Inconel Screen Cloth five years ago by setting up a number of practical field tests under the most adverse field conditions and with the requirements that satisfactory screen cloth material must perform under all normal atmospheric conditions to resist corrosion, discoloration, and leaching. Following are some typical tests and observations:

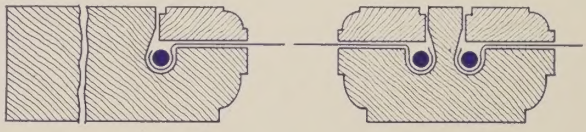
Exposed since July 31, 1931, in Staten Island. Subjected to salt atmosphere constantly and industrial chemical discharges—no discoloration, no corrosion, no leaching. White zinc paint on wooden frame not discolored.

Exposed three years in Pittsburgh next to Pennsylvania Railroad. Constantly subjected to abnormal acid and chemical atmospheric conditions—no discoloration, slight pitting due to acid, no leaching.

Exposed Brigantine, New Jersey, since October, 1931. Constantly under salt water spray—no discoloration, minute corrosion, no leaching.

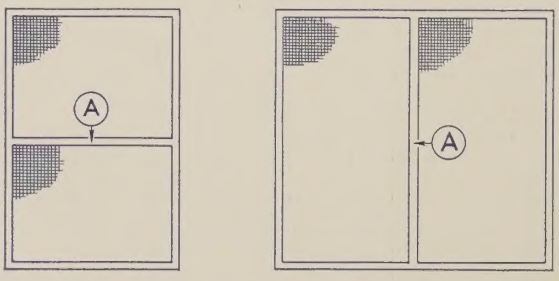
Exposed on prominent Atlantic seacoast club, over railroad, for over three years under conditions far worse than any normal atmosphere. Result: No leaching, no corrosion.

Testimony of many private users during the last year show similar satisfactory results in areas usually affected by salt water conditions and air impregnated with destructive chemicals. See also last page.



STILE and RAIL

BRACE "A"
1/4" O iron rod
optional



Horizontal and Vertical Braces

WHEN THE ARCHITECT FACES A SCREENING PROBLEM

THIS Reference Bulletin naturally cannot constitute a complete treatise on the subject involved. Its purpose, however, is to present certain of the more important practical suggestions and considerations in a concise manner designed to save time for the architect and to act as a check list when details and specifications are being prepared for individual projects. On this and the next pages are shown descriptive details primarily meant to indicate good practice in design. These include suggestions for both wood and metal frames together with accessories which add much to the satisfactory performance of such installations. Beginning on page 6 will be found standard specification data as established by the New York Building Congress and quite generally accepted by architects throughout the country.

NOTES ON WINDOW, DOOR AND PORCH SCREEN CONSTRUCTION AND INSTALLATION

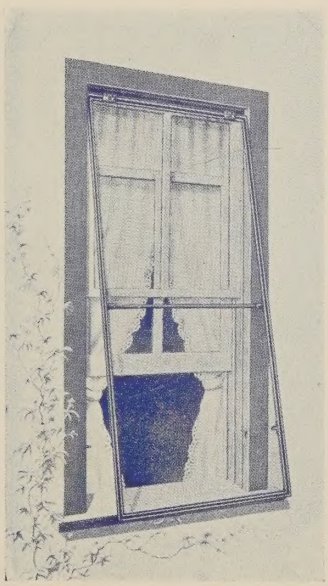
FOR many years screens were included in the architects' specifications under the division on carpentry. Some twenty years ago, metal frames were introduced and this led to a considerable development on the part of manufacturers of wood screens which in reality became specialty designs following the lead of the metal screen manufacturers.

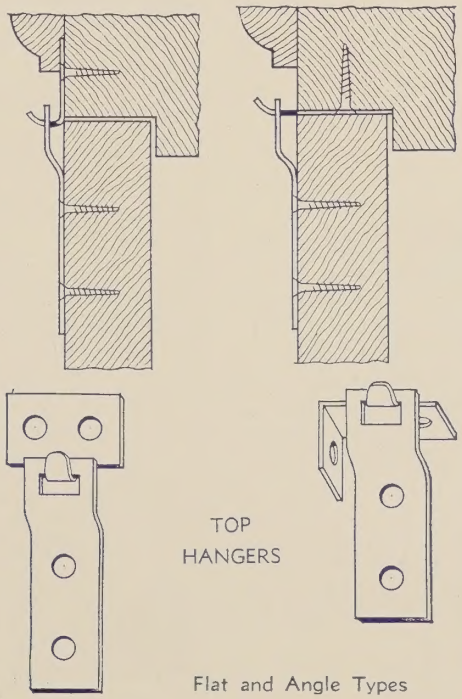
Today the architect who faces a screening problem of any type has two choices as to procedure because complete screen jobs are provided in two ways. For larger projects, particularly in urban areas, the screening project for any type of building except very small residences, is carried out through manufacturers of screen windows and doors. Usually representatives of these manufacturers (who may be specialty contractors) will take the architects' details and specifications and bid the complete job installed either as a direct bid to the owner or through the general contractor. This is almost invariably the case where metal frames are called for or the more intricate types of wood frames. The other method employed, when wood frames are involved is to place the job through the carpenter contractor or general contractor having the frames actually made by local woodworking concerns (often part of the organization of lumber and building material dealers). Screen manufacturers have themselves developed many improvements and special methods of solving various types of problems involved in any project. Many of them maintain helpful service departments which in turn may prove of considerable value in assisting the architect toward a logical solution of problems along this line. Such service is available almost anywhere in and adjacent to larger cities and towns. It is also easy to find in any community building material dealers or woodworkers who are experienced in this line of work. Most screening problems faced by architects cannot be solved by the use of standard screens but the screens for the entire project almost invariably must be made to order and careful measurement.

A few suggestions follow. Some of these may seem unnecessary but they are given as random notes for whatever value they may possess as far as the individual project is concerned.

Get up-to-date catalogs from several leading screen manufacturers (also see Sweet's Catalog). Names will be furnished by application to The International Nickel Company. Check the enclosed post card for this information.

Top Hung Screen

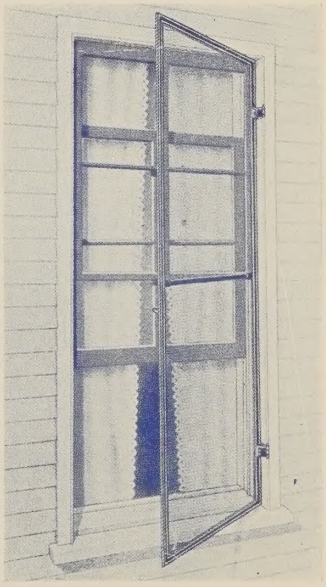




TOP HANGERS

Flat and Angle Types

Side Hung Screen



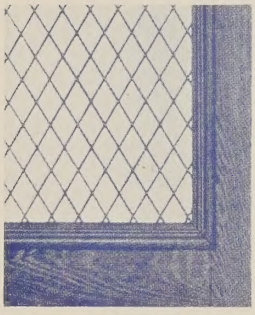
Check with contractors for local woodworking organizations capable of rendering this type of service.

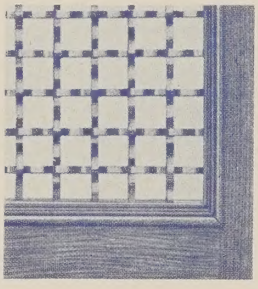
Read pages 6 and 7 following and send to the American Institute of Architects for standard documents which can be incorporated in your specifications as described.

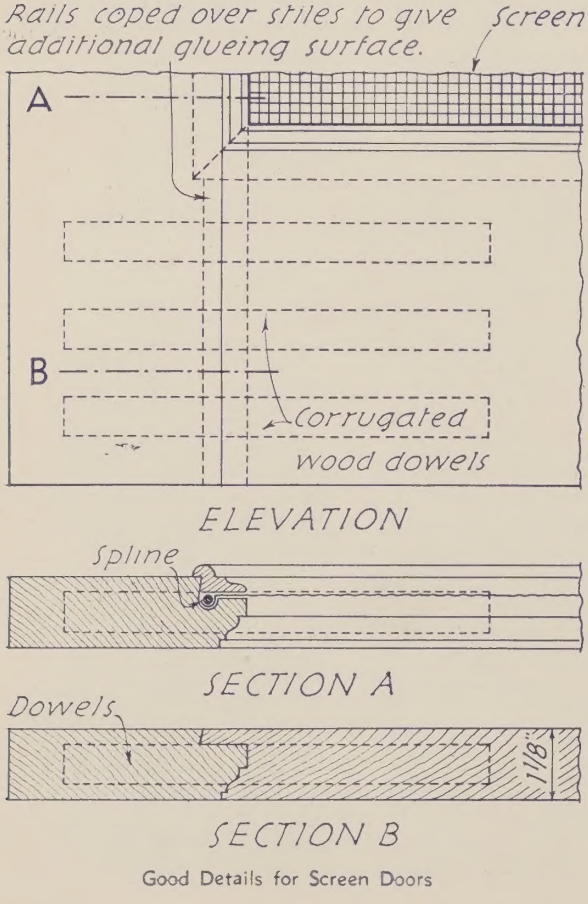
Use full length screens on the outside of all double hung windows where possible to provide top and bottom ventilation. These screens may be either top hung or side hung with inside hooks. Makes cleaning easy and unlawful entry difficult.

Decide on type of screens during preparation of working drawings. Provide for their ultimate installation because they will eventually be required and it is easy to provide for future use of screens in an economical and satisfactory way as follows:

(a) Provide a suitable frame work at top, sides and bottom of all openings for reception of screens.







Good Details for Screen Doors

(b) Arrange all sash, blinds, shutters, doors, flower boxes, curtains, drapes, electrical fixtures, and hardware so as not to interfere with the installation of proper screening.

(c) Where awnings are to be used, top or side hung screens cannot be used. This requires a single or twin sliding type screen—preferably a twin sliding. Use these also where flower boxes require watering from the inside.

(d) Provide duplicate brass numerals on all screens and corresponding openings for easy reinstallation.

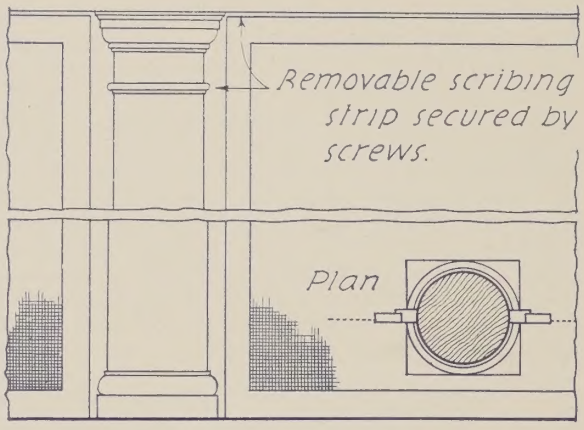
(e) All hardware suggested of solid brass, painted galvanized steel, or solid white nickel alloys.

Put wire guards over cellar windows, bottoms of screen doors and bottoms of porch screen panels as shown.

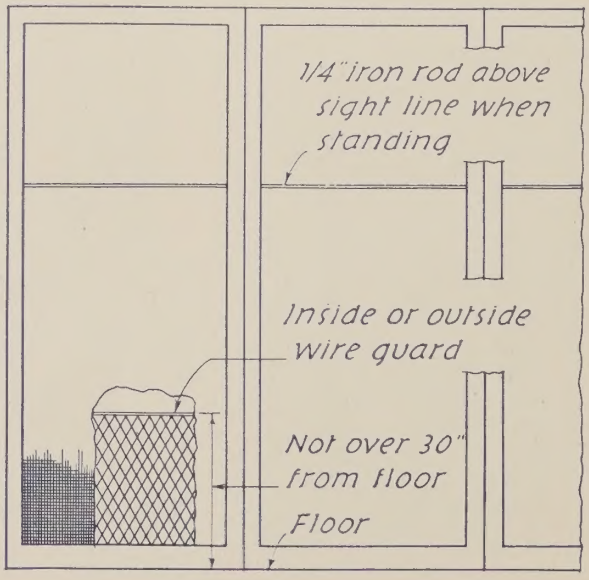
Be sure that all louvres in attic tower openings, etc., are screened to keep out birds, squirrels, as well as insects.

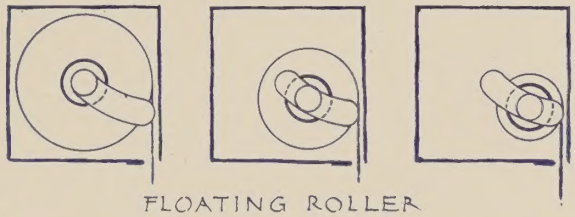
Don't forget a screen door between attached garage and the house. Also to screen all outside cellar doors.

AT LEFT ARE SHOWN TYPICAL GUARDS for bottom panels of door and porch screens—available in flat and round wire patterns.



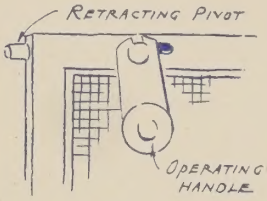
Correct Practice in Porch Screening



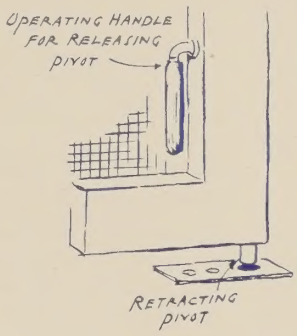


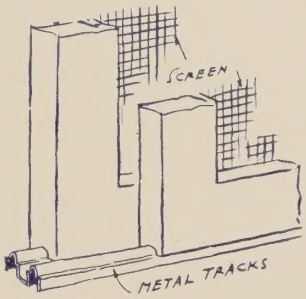
FLOATING ROLLER

THIS ENTIRE ROLLER ASSEMBLY AUTOMATICALLY MOVES FORWARD AS SCREEN IS UNWOUND WHICH PREVENTS DRAG ON LOWER EDGE OF HOUSING...

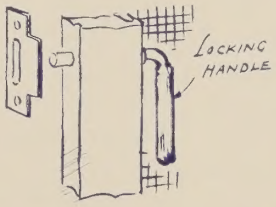


A PIVOT ASSEMBLY for TOP HUNG SCREENS

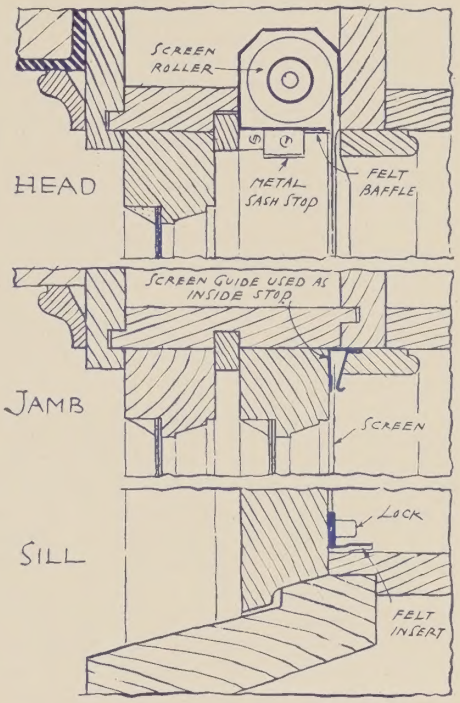




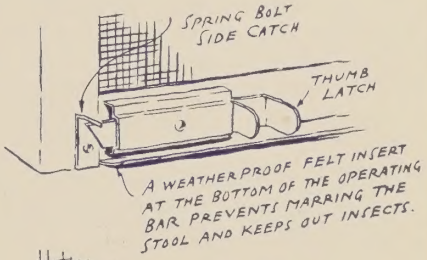
DETAILS of SLIDING SCREENS

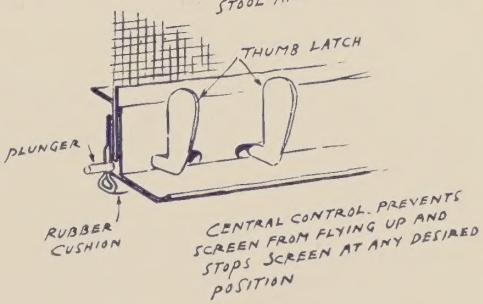


SPRING BOLT



CONCEALED INSTALLATION for WOOD DOUBLE HUNG WINDOWS.


SPRING BOLT SIDE CATCH
THUMB LATCH
A WEATHERPROOF FELT INSERT AT THE BOTTOM OF THE OPERATING BAR PREVENTS MARRING THE STOOL AND KEEPS OUT INSECTS.


THUMB LATCH
PLUNGER
RUBBER CUSHION
CENTRAL CONTROL. PREVENTS SCREEN FROM FLYING UP AND STOPS SCREEN AT ANY DESIRED POSITION

OPERATING CATCHES for ROLLER SCREENS

MODERN SCREEN DETAILS DEMAND A LIFETIME SCREEN CLOTH

THE accompanying sketches indicate but a few of the recent improvements in screen frame and operating design. These have been selected at random after a study of suggestions made by some of the better screen manufacturers.

The primary purpose in this presentation is to indicate that when so much care is given to details of screen construction and operation, it is obvious that equal care should be given to specifying a screen cloth which will have a lifetime equal to the frames, and subject to constant operation with a minimum of wearing or depreciation.

NOTE: There is no electrolytic action between Inconel Screen Cloth and bronze, aluminum or other metal frames.

Plan and build all outside porches so they can be easily screened. When screening porches, have wire go within six inches of porch floor so as not to cut off circulation of air near the floor.

Open screen doors of porches out so that insects will not be taken in when doors are opened.

We emphasize again the importance of guard wire for protecting bottom panels of door and porch screens. Also design these screens so that lower panel may be rewired without disturbing upper panel.

Equip all screen doors with closing devices and keep hardware from interfering with door behind it.

Never have a cross bar in porch screens at the sight line, either sitting or standing.

Paint all edges of screens after being fitted to openings.

Be sure that hangers and fittings on outside screens do not prevent closing of shutters after screens are removed.

Use three butts on large screen doors. For convenience in handling, do not make porch screen sections too large.

While 16-mesh is customary for screen cloth, some sections, particularly seashore, may require 18-mesh to keep out midges, gnats, and other small insects.

Use screen cloth which has the life of the frame and will not stain surrounding areas—this is INCONEL.

RECOMMENDED SPECIFICATIONS FOR WINDOW AND DOOR SCREENS

THE following constitutes a simplified method of establishing specifications for window and door screens in such a manner that practically all important points are covered. These recommended specifications are divided in two parts—PART A should bring in any special features related to the individual job including manufacturers' names, trade marks, and provisions for special parts of the plan; and PART B consists of the standard specifications for window and door screens developed by the New York Building Congress and issued in printed form by the American Institute of Architects (Division 35-P-1). This document consists of three printed specification pages made available in any quantity for a small charge by application to the Institute. It is recommended that this standard printed Part B should be inserted in the architect's general specifications.

PART A. WINDOW AND DOOR SCREENS

THIS part will be prepared by the architect according to the requirements of his individual project. A good opening paragraph under the heading "WORK INCLUDED," is as follows:

1. The Contractor shall furnish all the materials and equipment and perform all the labor for the execution of the work in connection with the fabrication and erection of all Window and Door Screens, shown on drawings or herein mentioned in Part A of this Division in accordance with the requirements for materials and workmanship specified in Part B of this Division.

The other numbered sections under "Work Included" should consist of:

2. Manufacturers' or brand name of types of screens to be used for all window openings. Also specify if wood or metal and give brief description of the construction, finish, screen cloth (INCONEL, Bronze, etc.), and hardware combinations (preferably by manufacturers' or brand names).
3. Specify screening of basement window openings with appropriate hardware.
4. Specify any ventilating louvres or other special exterior openings to be screened.
5. Specify screening for all exterior doors including guards for lower panels, etc.
6. Specify which porches are to be screened including type of frame, type of screen wire and how they should be made removable and attached to porch members. Also specify any guards, reinforcing rods, etc., which may be required.

In other words, fill in all specific requirements not covered by the standard specifications (Part B) which follow.

NOTE: Be sure to specify in this Part A .009" Inconel Screen Cloth, 16 or 18 meshes to the inch. (The printed document Part B which follows was produced before the advent of Inconel Screen Cloth and consequently under the heading "Wire Cloth" recommends only bronze screen cloth unless otherwise specified in this Part A.)

PART B. WINDOW AND DOOR SCREENS

FOLLOWING are standard specifications developed by the New York Building Congress published by the American Institute of Architects and recommended for use by most of the American Institute of Architects chapters throughout the country.

GENERAL CONDITIONS. **(1)** General conditions of the contract of the American Institute of Architects, current edition, shall form a part of this Division, together with the Special Conditions, to which this Contractor is referred.

ARBITRATION CLAUSE. **(2)** Any dispute or claim arising out of or relating to this Contract, or for the breach thereof, shall be settled by arbitration. Arbitration shall proceed under the requirements specified in the General Conditions, current edition, of the American Institute of Architects; or under the Rules of the Arbitration Court of the New York Building Congress, or of the American Arbitration Association, and judgment upon an award may be entered in the court having jurisdiction. One of these methods of arbitration shall be chosen at the time of signing the contract, or, if not then determined, the choice of these methods shall be at the option of the party asking for arbitration.

SCOPE. **(3)** The following requirements in regard to materials and workmanship specify the required standards for all labor, materials and appliances necessary for the fabrication and installation of Screens for doors, windows or other openings or enclosures. **(4)** These requirements, however, form a part of the Contract only in so far as they describe items mentioned in Part A of this specification, or as indicated on the Contract drawings.

SHOP DRAWINGS AND SCHEDULES. **(5)** This Contractor, before proceeding with the fabrication of screens, shall prepare and submit to the Architect, for approval, prints of shop drawings and schedules in duplicate, illustrating, in detail, the construction of screen frames, the method proposed for securing the wire mesh to the screen frames and the screen frames to door and window frames or other openings or enclosures. They shall also schedule the number and size of the opening or enclosure to be screened, and indicate whether screens are fixed, sliding or hinged to swing. **(6)** These drawings and schedules shall be based on actual measurements taken at the building and shall be

modified and revised within the limits of the Contract drawings and this specification, as may be required by the Architect. When these drawings and schedules have been approved, they shall govern the execution of the work.

EXTENT OF WORK. **(7)** The openings to be screened, the portion of opening covered, the type, location and operation and materials of construction, shall be as specified under Part A. The construction of each type shall conform to the following requirements, unless otherwise stated under Part A, or indicated on the Contract drawings.

WOOD FRAMES. **(8)** Wood screen frames for window openings shall have stiles and rails of not less than the following sizes:

Area of Window Openings	Stiles and Top Rails	Bottom Rails
Ten (10) square feet or less in area.....	25/32" x 1⅝"	25/32" x 2"
Over ten (10) square feet in area and less than twenty (20).....	25/32" x 2"	25/32" x 2⅜"
Twenty (20) square feet or over in area.....	25/32" x 2⅜"	25/32" x 3"

(9) Where screen frames are specified or indicated on Contract Drawings to extend over entire window opening, an intermediate rail coinciding with sash meeting rail shall be provided in all screen frames exceeding 24" in width and 48" in height. **(10)** Where, under Part A, the screen rails are specified to be 1⅛" in thickness, the widths of stiles and rails shall conform to the sizes listed above. **(11)** Wood frames for screens for door openings shall have stiles, lock and top rails at least 1⅛" x 3½" width; bottom rail, 1⅛" x 6". **(12)** All wood frames for screens shall be mortised and tenoned and pinned together. Tenons shall be well coated with white lead or linseed oil immediately before frames are assembled. **(13)** All stiles and rails shall be grooved to receive wire mesh which shall be held in place with mouldings, cut with a tongue fitting into the grooves, or splines may be driven into the grooves and covered with the moulding. Tacked or stapled work will not be accepted. **(14)** All woodwork shall be given a priming coat of white lead and oil before assembling. After screens have been completed and fitted they shall be painted two coats of lead and oil paint of colors as selected by the Architect.

METAL FRAMES. **(15)** Metal frames for window screens shall consist of sheridized steel, bronze or Monel Metal or aluminum of tubular or solid bar construction, as specified under Part A. Metal for tubular construction shall be not less than .036" in thickness; solid bar construction shall be not less than ¼" in thickness with all corners welded. **(16)** The width of stiles and rails shall conform to the following requirements:

TUBULAR CONSTRUCTION

Area of Window Opening	Width of Stiles and Rails
Ten (10) square feet or less in area.....	1¼"
Over ten (10) square feet in area.....	1½" with cross rail in all screens over 54" high and a vertical bar in all screens over 50" wide.

SOLID BAR CONSTRUCTION

Area of Window Opening	Width of Stiles and Rails
Ten (10) square feet or less in area.....	¾"
Over ten (10) square feet in area and less than twenty (20).....	⅞"
Twenty (20) square feet or over in area.	1⅛" with cross bar in all screens over 54" high and a vertical bar in all screens over 50" wide.

(17) Screens, side hinged or pivoted, shall not be wider than 24". Openings in excess of 24" in width shall have screens in two or more sections conforming to the above requirements. **(18)** Metal frames for door screens shall have stiles, lock and top rails approximately three (3) inches in width; bottom rail approximately 6 inches. **(19)** All joints between screen frame members shall be reinforced and welded or brazed on under side with all exposed surfaces flush. **(20)** Wire mesh shall be held in metal frames in such manner as readily to permit rewiring without injury to the frames or mouldings. **(21)** Where steel frames are specified they shall have a priming coat of non-corrosive paint followed by two coats of enamel, baked on, of colors as selected by the Architect. **(22)** Bronze frames shall have statuary finish. Frames of Monel Metal or aluminum shall be finished as specified under Part A.

WIRE CLOTH. **(23)** Wire cloth for screens shall, unless otherwise specified under Part A. consist of No. 32 U. S. gauge pure bronze wire woven sixteen (16) meshes to the inch. (See "NOTE" column 2, page 6.)

GUARDS. **(24)** Where guards are specified for door, porch or other enclosure screens they shall be constructed of solid flat brass or bronze ribbon or solid bronze or galvanized or bronze plated steel, as specified under Part A, conforming to the following requirements for thickness of ribbon, gauge of wire and weaving. **(25)** Flat Ribbon—¼" wide. No. 20 U. S. gauge woven 1¼" on centers. **(26)** Round Wire—No. 20 U. S. gauge woven three (3) inches to the inch. **(27)** Where galvanized or bronze plated steel round wire guards are specified, wires shall be soldered at all crossings. **(28)** All guards shall be placed close against the wire cloth and be firmly secured to the frame. The finish of all bronze guards shall match the color of the wire cloth.

HARDWARE. **(29)** Where window screens are specified to slide, either vertically or horizontally, they shall be provided with guides, compression springs and bronze lifting handles, two to each screen frame. The guides shall consist of extruded or drawn sections and be secured to the window frames by this Contractor. Guides for wood screen frames shall be of copper, zinc or bronze; for metal screen frames, guides shall be formed of the metals specified for the frames. **(30)** Stationary screens shall be secured to window frames with hooks and eyes, spring bolts or other device approved by the Architect. **(31)** Where window screens are specified to swing, they shall be provided with bronze top and bottom pivots or bronze side hinges and spring catches. Screens over 50" in height shall have three hinges and two catches to each section. **(32)** Screen doors shall be equipped with hardware of type enumerated under Part A.

MEASUREMENTS, TAGGING, AND INSTALLATION. **(33)** This Contractor shall obtain and be responsible for all measurements. Each screen shall be designed, constructed and fitted to a particular opening so that when installed the screens will closely fit the opening and be insect proof. **(34)** Each screen frame shall be provided with a bronze numbered tag. A similar numbered tag shall be provided and installed on the window or door opening. **(35)** All screens shall be installed in place complete and ready for use or, after fitting, stored in the building as directed.

GUARANTEE. **(36)** This Contractor shall furnish, as part of his Contract, a written guarantee warranting all material and workmanship furnished under this Division, for a period of one year from and after completion and acceptance, as evidenced by date of final payment, and binding himself to repair or replace without additional compensation beyond the Contract amount, and all work which becomes in any way defective during that period, not due to wear and tear.

HOW TO OBTAIN INCONEL SCREEN CLOTH

FULL information on INCONEL *"AGELESS"* Screen Cloth has been sent to all of the leading manufacturers of metal and wood window and door screens—also to metal window manufacturers who supply metal screens as part of the window equipment. In addition, such information has been sent to several thousand building material dealers and woodworking plants located in every section of the country. Thus Inconel Screen Cloth is available anywhere for contract bids by screen manufacturers and also available through local woodworking organizations where the screen cloth is specified for use in wood frames of any type.

COMPARATIVE COSTS

THE specification using INCONEL *"AGELESS"* Screen Cloth will normally not include the term "or equal," because there is no other screen cloth on the market which is made of Inconel or its equivalent. It is suggested that in obtaining bids the architect shall ask for prices including complete installation, using Inconel Screen Cloth and also using other types of screen cloth. The difference in the cost of this material will be so relatively small on an individual job that its superiority of performance will recommend to the architect and owner the wisdom of making the small additional investment which will be called for. The handling of this screen cloth is exactly the same as any other, except that care should be taken to specify the use of Inconel tacks or staples.

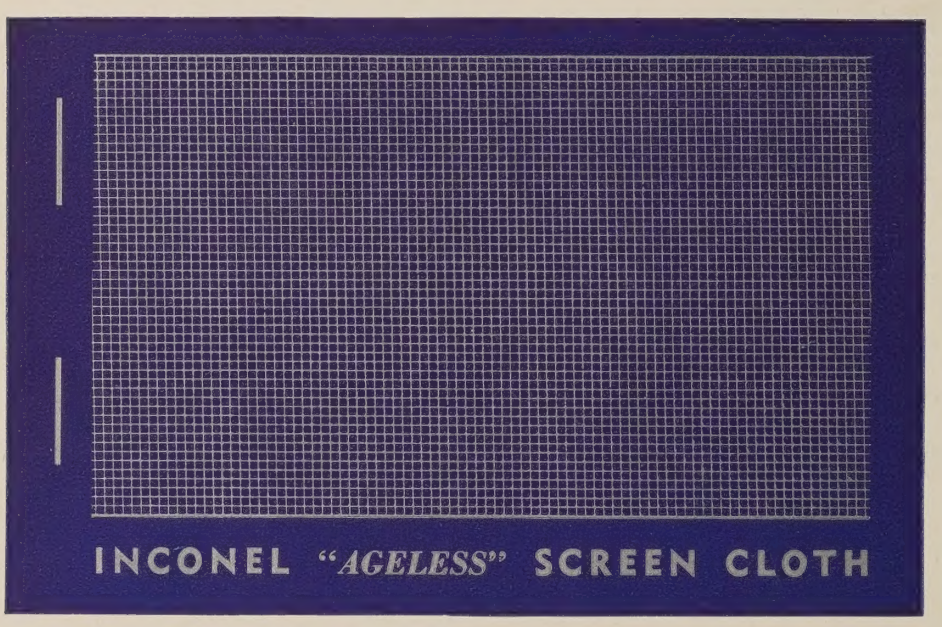
Again the point is stressed that the only proper way to make a comparison of costs on screening jobs is to compare the final cost of the finished screens. The comparative cost of screen cloth itself would be highly misleading if it were used for making final decisions as to the type of material to be specified, for example, quotations which have been given out by various screen manufacturers would indicate that a metal frame job using Inconel Screen Cloth would cost only about 15% more than if bronze screen cloth were used, even in view of the fact that Inconel Screen Cloth sells for more than twice the price of bronze.

ADDED VALUES AT MODERATE COST

THIS expenditure of approximately 15% more on a finished screen job to admit the use of Inconel Screen Cloth makes it possible to equalize the life of the frame and the wire cloth. In other words, there will be no maintenance cost and no replacement necessary except through abuse. Additional savings are accomplished because there is no staining of frames and exterior walls. This is undoubtedly the reason why Inconel Screen Cloth is being specified on important jobs in many sections of the country. High class hotels under difficult exposure conditions such as Chicago and in Miami Beach have standardized on Inconel screening and are repeating orders as required. In addition, many architects and owners are reporting very satisfactory results after practical installation of Inconel Screen Cloth, demonstrating good performance under difficult conditions.

TO OBTAIN ACTUAL SAMPLE SIGN AND MAIL ENCLOSED POST CARD

Available in standard widths—16 and 18 mesh



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